

UNITED STATES MARINE CORPS
Logistics Operation School
Marine Corps Combat Service Support School
PSC Box 20041
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LS 103

STUDENT OUTLINE

LOAD CARGO ON SHIPS

LEARNING OBJECTIVES

1. Terminal Learning Objective: Given necessary tools, dunnage and equipment, load cargo on ships in accordance with FMFM 4-3, Joint pub 3.02.2, FMFRP 1-18, MTMCTEA Pamphlet 700-4 and MTMCTEA Pamphlet 95-55-22. (0481.01.09)
2. Enabling Learning Objectives:
 - (1) Without the aid of references, identify safety procedures for port operations in accordance with FMFM 4-3, Joint pub 3.02.2 and MTMCTEA Pamphlet 95-55-22. (0481.01.09a)
 - (2) Without the aid of references, identify material handling equipment in accordance with TM-11275-15/3. (0481.01.09b)
 - (3) Given a loading situation, without the aid of references, demonstrate the hand and arm signals for crane operations in accordance with FMFM 4-3 and MTMCTEA Pamphlet 95-55-22. (0481.01.09c)
 - (4) Without the aid of references, list the considerations for loading cargo on ships in accordance with FMFM 4-3, Joint pub 3.02.2 and MTMCTEA Pamphlet 95-55-22. (0481.01.09d)
 - (5) Without the aid of references, identify amphibious ships and landing craft in accordance with FMFMRP 1-18, and MTMCTEA Pamphlet 700-4. (0481.01.09e)

OUTLINE

1. **SAFETY PROCEDURES FOR PORT OPERATIONS**. For each port,

standard operating procedures will vary. The safety procedures will remain the same. Below is a list of safety precautions to follow while conducting a port operation.

- a. You must be alert at all times.
- b. Wear roadguard vest.
- c. Wear safety boots.
- d. Stay clear of moving loads at all times.
- e. Never put yourself between a moving load and fixed object.
- f. Never walk backwards.
- g. Always face the load.
- h. Stand where the MHE operator can see you at all times.
- i. Do not walk or get under any suspended load.
- j. There are many more safety precautions that could be listed, most of all, use common sense.

2. MATERIAL AND HANDLING EQUIPMENT.

a. For each port operation, Material Handling equipment (MHE) will be utilized.

(1) RT 4000. Capable of lifting 4000lbs of cargo and equipment.

(2) Extended Boom Forklift (EBFL). Capable of lifting 6000lbs with the small forks and 10,000lbs with the large forks.

(3) TRAM. Capable of lifting 10,000lbs of cargo and equipment.

(4) 7 ½ ton crane. Capable of lifting 15,000lbs of cargo/equipment.

(5) 25 ton crane. Capable of lifting 50,000lbs of cargo/equipment.

(6) Rough Terrain Container Handler (RTCH). Capable of lifting large containers and weights up to 50,000lbs.

3. **HAND AND ARM SIGNALS FOR CRANE OPERATIONS.** Standard hand and arm signals are the same throughout the world. Here are some basic hand and arm signals.

- a. Raise the hook/load.
- b. Lower the hook/load.
- c. Raise the boom.
- d. Lower the boom.
- e. Stop boom.
- f. Slew/Rotate the crane.

4. **CONSIDERATIONS FOR LOADING CARGO ON SHIPS.** These are some of the most common terms that you will come across while working on a port operation.

- a. Terms.

(1) CCO Combat Cargo Officer. Coordinates and supervises the execution of the loading plan.

(2) MHE Material Handling Equipment. Equipment used for moving cargo within a port facility.

(3) EMB Embarkation. Loading all cargo and personnel aboard an amphibious ship.

(4) AA Assembly Area. Designated area where all personnel and cargo will be staged.

(5) POG Port Operation Group. All personnel who are overall in charge of loading the ship.

(6) POE Point of Entry. The entrance to the port facility.

(7) POD Point of Departure. The exit to the port facility.

(8) DON Department of the Navy.

(9) FDO Flight Deck Officer. Officer overall in charge of all cargo and equipment on the flight deck of the ship.

(10) Berth Pier. Point at which the ship is docked.

b. Principles of staging.

1. Support the plan. You have carefully planned your load to support operations. Now you must plan your staging to support the type of transportation you're using. Ships vary, your staging plan must account for these variances.

2. Expedite loading. There may be many ships loading in sequence. We want our loading accomplished as quickly as safety will allow; and clear the port as quickly as possible.

3. Protect the cargo. All cargo is important! Yes Some cargo is more critical than others, but all cargo is important or we wouldn't be spending this much effort and money to move it.

4. Provide for control. If we're really going to be successful, we have to control the action. Therefore, we need to provide control measures for safety, security, productivity and just plain convenience.

c. Basic marking. Basically the information marked on the containers is the same, but the size and color vary. Containers and pallets are marked on (3) sides.

(1) Storage Designator - A colored circle painted in the upper left hand corner.

(2) Unit Identification.

(a) Rectangle -FSSG

(b) Triangle- FMF HQ, MEF HQ, MEB HQ, MEU HQ

(c) Half Circle-Marine Air Wing

(d) Diamond - Marine Division

(3) Embarking Vehicles.

(a) Priority number -15.

(b) Landing Serial number -4566 Marines may have as many landing serials as needed.

(c) Ship Hull number LHD-1.

(d) Storage location on ship 2nd Deck 1st Hold. Landing serials must not be separated from one deck to another.

(e) Color Coded Circle.

d. Mobile load.

(1) Restrain mobile load of light cargo using 1/2 inch rope or a 5000lb Cargo Utility Strap (CGU).

(2) Lace the rope/strap over the cargo/bed of the truck like a shoe lace.

(3) Use the canvas to waterproof the cargo. Put the canvas under the rope/strap.

(4) Do not exceed the cross country weight of the vehicle.

(5) Use the appropriate size tie-down devices and chains for heavy equipment and outsized cargo.

(6) Use blocks and bracing material in the bed of the truck.

(7) Only reduce vehicle when necessary, (i.e. remove canvas etc.). Unnecessary reduction takes time and vehicle parts are sometimes lost.

(8) Tie down cargo according to the load plan.

e. Containers. The Department of Defense has purchased containers to better transport equipment and supplies. There are several types of containers starting from the smallest to the largest.

- (1) Insert- 10"x17"x45"
- (2) Palcon-40"x48"
- (3) Quadcon- 82"x57.5"x96
- (4) Halfcon-8'x8'x10
- (5) Sixcon -4'x6'
- (6) Milvan- 8'x8'x20'
- (7) Conex-8'x8'x40'

f. Rigging and tie-down procedures. The Military Traffic Command Transportation Engineering Agency (MTMCTEA) has published a guide book for lifting and lashing cargo and equipment to a ship. (MTMCTEA PAMPHLET 95-55-22).

(1) Rigging of equipment will depend on the type of Cargo and equipment being lifted.

(2) There are many different types of hardware used to tie-down vehicles and cargo to a ship deck.

g. Security and control of personnel. During any operation, security will always play an important role whether it be for equipment, supplies, personnel or nature of the operation. Guards will be assigned to the port by the deploying unit as well as military police. If the deploying unit cannot supply the guard, Landing Support will assist.

(1) Control of personnel in a large area. We will cover and discuss each one:

(a) Deploying Unit - Once the Marines arrive at the port a Landing Support Specialist should be there to brief them on where to go, and what should be done.

(b) Media - If at all possible the media should be briefed prior to the port operation to prevent any problems from occurring. If not, brief them at the front gate.

(c) Family - Whether a Marine is departing or arriving, there will always be a problem with the families. To prevent these problems from occurring, no family members are to be allowed on the port, for safety and security reasons.

5. AMPHIBIOUS SHIPS.

a. Amphibious Command Ship (LCC) (Blue Ridge Class).

(1) Mission. The mission of the amphibious command ship (IOC) is to serve as flagship and headquarters for the commander Amphibious Task Force (CATF) and Commander Landing Force (CLF). This ship functions as the operation center from which all command guidance and orders originate. It is designed primarily to fulfill communications and control requirements of surface, subsurface, and air units engaged in amphibious assaults. A helicopter platform located on the stern of the ship provides added versatility.

(2) General Comments. The LCC can be easily recognized by the relatively short superstructure midship with a tower-like mast mounted just over the bridge. A large antenna farm provides optimum electromagnetic propagation of the communications systems. The LCC is the nucleus and nerve center of the Amphibious Task Force. There are only two LCC's in the Navy. One is located on the west coast for operations in the Pacific and the other is on the east coast. Normally a Marine Expeditionary Force (MEF) size operation will be the only time the LCC will deploy. For smaller amphibious operations, one of the other amphibious ships would assume the command and control, such as an LHA or LHD.

(3) Cargo capabilities. The LCC is configured primarily as a command ship. There are no provisions for carrying landing force cargo other than the small equipment items and some of the vehicles which are organic to the embarked staffs

b. Amphibious Assault ships.

(1) General Purpose Amphibious Assault Ship (LHA-1) (Tarawa Class).

(a) Mission. Designed to embark, deploy, and land

elements of a landing force in an assault by helicopters, landing craft, and amphibious vehicles.

(b) General Comments. This new class of large amphibious warfare ships combines the major characteristics of the attack cargo ship, the helicopter carrier, and the amphibious transport dock into a single hull. These features include; a full length flight deck, a landing craft docking well, a large storage area for trucks and armored vehicles, and troop berthing for a reinforced battalion. Beneath the flight deck is a half-length hanger deck. The well deck is located beneath the hanger deck and is capable of accommodating four LCU-1610 landing craft. A bow thruster is provided for holding position while off-loading craft. The flag complex is designed to support a Marine Expedition Unit (MEU) staff and the amphibious squadron commander and his staff. Medical facilities include two independent operating rooms with a capacity for 369 bed patients.

(c) General Characteristics. The LHA is a complex system incorporating many of the best design features of several assault ships currently in service. The LHA combines the operational capabilities of the LKA and the LSD. Important design include; a unique automated cargo handling system which permits selective access to cargo, a system of handling landing craft and amphibious vehicles which improves safety, loading, and turn around procedures.

(2) Multipurpose Amphibious Assault Ship (LHD). Mission. To embark, deploy, and land elements of the landing force in an assault by helicopters, landing craft, and amphibious vehicles.

(a) The major design changes from the LHA are:

- (1) Well deck space for LCACs.
- (2) Stern gate changes.
- (3) Cargo elevators will service the flight deck.
- (4) 600 hospital beds and 6 operating rooms.

3. Amphibious Assault Ship (LPH) IWO JIMA Class.

(1) Mission. To transport troops and equipment for

amphibious operations and land them by means of helicopters during the vertical envelopment phase of the assault.

(2) Located on both port and starboard sides are aircraft elevators used for lowering both cargo and vehicles to its hangar deck. On the flight deck are 7 CH-46 equivalent, helicopter landing positions.

c. Transport ships.

(1) Amphibious Transport Dock (LPD) (Raleigh and Austin classes).

(a) Mission. Transport troops and equipment for amphibious operations and land them in the assault area by means of landing craft carried in the ship's well deck or by helicopter in vertical assault.

(b) General Comments. The LPD is capable of ballasting to permit loading and launching of landing craft and amphibious vehicles. A limited number of helicopters may be transported on the flight deck as the ship serves as a helicopter platform for landing embarked troops and their supplies. It also serves as a refueling station for helicopters of the landing force. Improved facilities for handling and stowage of troop cargo are provided to reduce manpower and time required for combat loading and unloading. The electric pallet conveyers necessitate the maximum use of palletized cargo by embarked units. Ideally, at least 95 percent of all cargo should be palletized. Care must be exercised to ensure standard 40 inch x 48 inch military pallets be used and should not exceed the height of 52 inches in order to use the conveyor system. The LPD has a floodable well deck. "Floodable" means that the ship, using a series of ballast tanks, can lower her stern to allow up to 12 feet of water to enter the well deck. Vehicles and cargo are then loaded by means of landing craft and amphibious vehicles that enter the flooded well deck. Because the LPD has a floodable well deck, she can also conduct Amphibious Assault Vehicle launches.

(2) Dock Landing Ship (LSD) (Anchorage Class).

(a) Mission. To transport amphibious task forces to the objective area and launch pre-loaded landing craft and/or amphibious vehicles together with their crews and embarked

landing force personnel. These ships also provide limited docking and repair services to small ships and craft.

(b) General Comments. Although called a "landing ship", the LSD does not beach. A characteristic feature of the LSD is the well deck which resembles a floating dry dock. The ship can partially submerge the well deck to enable landing craft and amphibious vehicles to swim out via the stern gate. From a dry deck, the water level in the deck well may be varied in depth to 9 feet forward and aft, or to a dry dock forward and 9 feet depth aft. Temporary decks can be installed to carry the maximum number of vehicles.

(c) Super deck. Is erected over the well deck and is aft of the superstructure. Sufficient clearance for Landing Craft Utility (LCU) to be floated in their well deck is maintained. The forward super deck surface normally consists of a metal grate while the aft section is planked for use as a helicopter platform. The super deck is normally retained in place on ship unless removed for special operations. The well deck can be flooded to enable landing craft and amphibious vehicles to swim out via a stern gate. The water level in a flood well may be varied from ten feet forward to aft, to a dry deck forward and ten feet aft. The well deck of an Anchorage class LSD has the capacity to carry three LCUs or 19 LCM-6s or 47 AAVs. The Thomaston class LSD can carry two LCUs in the well deck, and a proportionately smaller number of LCM-8s and LCM-6s. The LSD has a portable water barrier which may be installed in the well deck. By installing the water barrier, the vehicle and stowage area is increased, since the forward area remains dry. Water barriers are seldom, if ever used. A mezzanine deck can be installed in both classes. When installed, it provides a series of ramps which lead from the well deck to the super deck. The ramps are removed when the mezzanine deck is not installed.

3. Dock Landing Ship (Whidbey Island Class)(LSD-41).

(a) Mission. The mission of the LSD-41 Class is of the same nature as the Anchorage Class.

(b) General Comments. The LSD-41 class will replace the LSD-28 (Thomaston) Class which are reaching their service lives. The LSD-41 will be able to operate with either conventional landing craft or the new air-cushioned landing craft (LCAC). The new class will provide for greater storage

space for weapons and equipment, improved facilities for embarked troops, longer range operations and the capability to embark the LCAC. A bridge crane is a newly added feature. This crane is comprised of two separate hoists capable of lifting 7 1/2 tons of cargo each. The new LSD has incorporated an LST like turntable. It is located between the well deck and the helicopter platform to assist in the rapid turn around of vehicles and equipment during the off load. Ramps go down from the helicopter deck to the turn table, turn the vehicle 180 degrees and then another ramp is used to go to the well deck to load the waiting landing craft.

d. Landing craft.

(1) Landing Craft, Mechanized (LCM) LCM Mark 6.

(a) Mission. To land medium-weight vehicles, equipment, personnel, and/or cargo on the beach in an amphibious assault. Capacity of assault troops with full battle equipment is normally limited as indicated unless sea, surf, and other overall safety factors are ideal.

(b) Capacities.

(1) Troops (combat loaded): 80

(2) Cargo: 34 tons

(2) Landing Craft, Mechanized (LCM) LCM Mark 8 - MOD-2.

(a) Mission. To land heavy vehicles, equipment, personnel, and/or cargo on the beach in an amphibious assault. The aluminum model LCM 8, as listed below, was built to reduce hoisting weight which allows it to be hoisted on board some amphibious ships. Like the LCM6, this craft has a bow ramp but with an improved design which permits an embarked tank to fire its heavy gun forward while enroute to the beach.

(b) Capabilities.		<u>Steel</u>
<u>Aluminum</u>		
(1) Troops (combat loaded):	150	200
(2) Cargo:	60 Tons	65
Tons		

(3) Landing Craft, Utility (LCU) LCU 1610 Class.

(a) Mission. To land very heavy vehicles, equipment, and/or cargo on the beach in an amphibious assault.

(b) General Comments. Originally the LCU was the Tank Landing Craft (LCT) of World War II which was designed and built for the purpose of landing tanks. Because of the craft's versatility and use in landing almost anything, the name was changed to LCU. This class has a bow ramp and hinged stern gate aft permitting passage of vehicles 12 feet 6 inches or less in width. The stern is constructed to permit limited utilization of one or more craft as causeway but only under ideal sea conditions. The LCU is equipped with surface search radar and is air conditioned.

(c) Capacities.

(1) Troops(Combat Loaded): 400

(2) Cargo: 180 Tons

(4) Landing Craft, Air cushioned (LCAC).

(a) Mission. To be utilized as a high speed, over the beach, landing craft capable of lifting all equipment organic to ground elements of the Marine Air Ground Task Force (MAGTF).

(b) General Comments. The LCAC was designed to enhance the present ship-to-shore amphibious capabilities of the Landing Force. The advantages inherent in the use of the LCAC are:

(1) Increased accessibility to landing sites.

(2) Increased Landing Force dispersion.

(3) Allows for operations independent of tides and weather.

(4) Significant reduction in requirements for beach engineering equipment.

(5) Forces the enemy to disperse and complicates his defense.

(6) Compatibility with all well dock ships.

(7) Cargo: 60 tons.

(8) Troops: Personnel 24 troops.

e. Maritime Prepositioning Ships (MPS).

(1) Mission. The MPS concept by design, lessens the Marine Corps' response time to deploy to forward areas by prepositioning the majority of equipment for a heavy mechanized Marine Expeditionary Brigade (MEB) on board forward deployed commercial vessels in strategic locations. Those vessels will be manned by Military Sealift Command (MSC) crews. In response to a contingency requirement or actual crisis, equipment aboard forward deployed prepositioned ships will be off-loaded and then joined with air-transported MEB personnel, helicopters, and other critical equipment not included aboard the ships. The necessary fixed-wing aircraft would self-deploy by being flight ferried. The marriage of prepositioned equipment, airlifted MEB personnel, and ferried tactical aircraft would rapidly complete the emplacement of a mechanized MEB in a foreign operation area. The MEB would be operational shortly after the airlift is completed. The U.S. Navy has contracted with industry to provide a total of 13 merchant-class ships in support of the MPS program. Of the 13 MPS ships, eight are conversions of existing vessels and five are newly constructed. There are 3 MPS squadrons with four to five MPS vessels per squadron.

(2) Three MPS Ship Classes.

(a) 5 MAERSK (civilian conversion).

(b) 3 WATERMAN (civilian conversion).

(c) 5 AMSEA (new construction, formerly called BRAINTREE).

(3) Long-term charter, civilian crew.

(4) Capacity each ship holds 1/4 to 1/5 of a MEB's T/E each.

(5) Ship's capabilities. Like any piece of gear, the MPF ships have specifications that all ships are required to have. Although different in several ways, they are capable of

some general functions that are identical. These characteristics are listed below.

(a) Instream, self-sustained unloading capability with organic landing craft/causeways.

(b) Unload in 5 feet waves/50/kt wind/3kt current.

(c) CH-53E helicopter capable flight decks.

(d) Night operations are being looked at for all the MPF ships. Note, that when a ship goes to flight quarters, all hands are required. This can impose restrictions on when and how long aircraft can be received. The helicopter flight decks are not for cargo transfer. They are really more for transporting advance units of the MEB Offload Preparation Party (OPP) to begin preparations for unloading.

(e) On board fuel/defuel of vehicles. MOGAS and DF-2 are not stored onboard MPF ships. Instead, JP-5 is the preferred storage fuel. It is anticipated the DF-2/MOGAS fuel can be added later to sustain follow-on operations.

(f) Onboard maintenance capability for embarked equipment.

(g) Limited selective unloading capability. MPF ships are loaded to make maximum use of space. True tactical considerations that would apply to amphibious assault ships do not really apply here. Current studies are being conducted that will most likely affect loading for selective unloading. Several of the concepts for employing the MPF are being looked at. It is these new concepts that will force us to deal with the selective unload issue.

(h) Secure voice communications.

(i) Discharge.

(1) Liquid cargo up to 2 miles offshore.

(2) LVTs launched from the stern ramp in 5 feet waves.

(3) All cargo unloaded in 5 days (pierside).

The unload times, pierside and instream, have proved to be somewhat optimistic. The Center of Naval Analysis (see the references in the instructor's binder) are tracking, during various MPF operations, what the baseline planning times are for unloading.

(4) All cargo in 7-9 days (in stream).

(5) 24 hours required to prepare for unloading.

(6) MPF Related Ships. There are two MSC controlled ships that are normally discussed as they relate to, but are not part of, an MPF operation. These ships allow for additional, substantial sustainability.

(a) T-AVB.

(1) One ship on each coast. (USNS Wright and the USNS Curtis).

(2) Not dedicated to MPF.

(3) Key features:

a. Roll-on/rolloff container capable.

b. Intermediate Maintenance Activity (IMA) embarked in MF vans.

c. Limited maintenance capability enroute and offshore. A complete unloading of the ship is necessary to make the ship truly capable of an (IMA).

d. Billeting for 300 maintenance personnel.

e. Saves 160 C-141B equivalent loads.

(b) T-AH. This will be controlled by the MCS and should be considered first, a theater commander's asset.

(1) Not dedicated to MPF operations.

(2) Key features:

- a. 12 operating rooms.
 - b. 20-bed recovery room.
 - c. Four 20-bed intensive care
wards.
 - d. Two 60-bed intermediate care
wards.
 - e. Seven 40-bed intermediate care
wards.
 - f. 500 limited care beds
 - g. 1,000 beds total.
- (3) One ship on each coast.

REFERENCES:

1. TM 11275-15/3. Principal Technical Characteristics of Engineer Equipment.
2. FMFM 4-3. MAGTF Landing Support Operations
3. Joint pub 3.02.2. Doctrine for Amphibious Embarkation.
4. FMFRP 1-18. Amphibious Ships and Landing Craft Data Book.
5. MTMCTEA PAMPHLET 700-4. Vessel Characteristics for Shiploading.
6. MTMCTEA PAMPHLET 95-55-22. Marine Lifting and Lashing Handbook.